



Earthquake Hazards Program

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Complete Report for Yucca fault (Class A) No. 1042

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Synopsis The Yucca fault is a north-striking, east-dipping, down-to-the-east, intrabasin normal fault in the medial part of Yucca Flat. The fault is marked by a conspicuous scarp, possibly as much as 15 m high, formed in Quaternary alluvium. The north end of the Yucca fault appears to merge with, or terminate at, the northeast-striking Boundary fault [1041], which is a range-bounding fault along the northeast margin of Yucca Flat, that shows evidence for latest Pleistocene or Holocene displacement. The age of the last Quaternary displacement event along the Yucca fault is not tightly constrained, but it is estimated to be late Pleistocene or Holocene. Estimates of slip rate for the fault are low (<0.2 mm/yr) and no information on the recurrence interval has been reported. Part of the fault has been activated by nuclear testing in Yucca Flat.

Name comments Name from Carr (1974 #1470) who applied the name to a north-striking, mid-valley, predominantly dip-slip fault in the central part of Yucca Flat; Piety (1995 #915) also referred to the fault by that name. dePolo (1998 #2845) portrayed this fault connected with the Butte fault to the north, and referred to the combined fault as the

(Carr, 1974 #1470, p. 26). Dips of 50° E. to 60° E. are observed on the southern half of fault (Carr, 1974 #1470).

Paleoseismology studies

Geomorphic expression

Marked for most of its length by a low, east-facing scarp (Barosh, 1968 #1443, p. 201). This scarp is noted to be "several hundred feet east of older buried parts of the fault zone" (Carr, 1974 #1470, p. 26). A scarp on an alluvial surface at the fault's northern end is noted by Barosh (1968 #1443) to be more than 12 m high and by Fernald and others (1968 #1512) to be about 15 m high. The height of the scarp is reported by Barosh (1968 #1443, p. 209) to be commonly 1.5 to 6 m. Carr (1974 #1470) did not find any evidence for multiple ruptures on at least the southern 16 km of the scarp associated with the Yucca fault. Barosh (1968 #1443, p. 209) reported low, east- and west-facing secondary scarps adjacent to the main scarp at a few places in central Yucca Flat. Dohrenwend and others (1992 #289) portray the fault as a nearly continuous, but slightly segmented, east-facing scarp on depositional or erosional surfaces of possible late Pleistocene age. Cracks and scarps that formed in alluvium during underground explosions are also preserved along the Yucca fault and branch faults adjacent to it on the east (Barosh, 1968 #1443, p. 210-211). These modern scarps slope 70° E or are vertical (Barosh, 1968 #1443, p. 211).

Age of faulted surficial deposits

Swadley and Hoover (1990 #1663) show the Yucca fault with displacement in Qap deposits (~160 ka to 800 ka) and QTa deposits (>740 ka) along most of its trace. Swadley and Hoover (1990 #1663) showed short portions of the Yucca fault as concealed by Holocene alluvium (younger than about 10 ka). They also portrayed Holocene alluvium as deposited against two scarps on surfaces of their Qap deposits. Dohrenwend and others, (1992 #289) portrayed the Yucca fault as scarps on depositional or erosional surfaces of possible late Pleistocene age (10- 130 ka).

Historic earthquake

Most recent

Late Quaternary (<130 ka)

prehistoric

deformation

Comments: Dohrenwend and others (1992 #289) portrayed the Yucca fault as scarps on depositional or erosional surfaces of possible late Pleistocene age (their Q2(?) surfaces with estimated ages between 10 ka and 130 ka), suggesting a late Pleistocene or Holocene age for surface rupture. Shroba and others (1988 #1641, p. 2) reported a minimum age of 35 ka for one of the younger events on the Yucca fault. This age was estimated by Knauss (1981 #1558) (cited in Shroba and others, 1988 #1641, p. 5) on the basis of uranium-series analyses on a carbonate-rich fracture filling. This 35-ka age, however, is considered poorly constrained stratigraphically. Barosh (1968 #1443, p. 201, 216) concluded that the low scarp "demonstrates the very recent age of the fault and there is no reason not to consider it an active fault". Fernald and others (1968 #1512, p. 50) reported that drainage development in Yucca Flat has been disrupted by displacement on the Yucca fault, which they concluded is still active. Carr (1974 #1470, p. 26) noted that the scarp has been modified by erosion but concluded on the basis of a comparison of the scarp associated with 100-yr-old scarps in Owens Valley that it probably formed between 1 ka and 10 ka. Some displacement along the southern end of the fault is historic in age and was induced by underground nuclear testing (Carr, 1974 #1470; Frizzell and Shulters, 1990 #1037). A late Quaternary (<130 ka) age for the most recent event is assigned to the fault, but that event might be as young as latest Quaternary (<15 ka).

Recurrence

interval

Slip-rate category

Less than 0.2 mm/yr

Comments: dePolo (1998 #2845) calculated a preferred vertical slip rate of 0.023 mm/yr for the fault, based on a "surface displacement" measurement made by Fernald and others (1968 #1512) and on estimates of surface ages interpreted from mapping of Swadley and Hoover (1990 #1663). The late Quaternary characteristics of this fault (overall geomorphic expression, continuity of scarps, age of faulted deposits, etc.) also suggest a low slip rate. Accordingly, the less than 0.2 mm/yr slip-rate category has been assigned to this fault.

Date and

Compiler(s)

1998
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